

EVAPORATED LaAlO_3 FILMS FOR GATE DIELECTRICS

ABSTRACT

A gate dielectric containing LaAlO_3 and method of fabricating a gate dielectric contained LaAlO_3 produce a reliable gate dielectric having a thinner equivalent oxide thickness than attainable using SiO_2 . The LaAlO_3 gate dielectrics formed are thermodynamically stable such that these gate dielectrics will have minimal reactions
5 with a silicon substrate or other structures during processing. A LaAlO_3 gate dielectric is formed by evaporating Al_2O_3 at a given rate, evaporating La_2O_3 at another rate, and controlling the two rates to provide an amorphous film containing LaAlO_3 on a transistor body region. The evaporation deposition of the LaAlO_3 film is performed using two electron guns to evaporate dry pellets of Al_2O_3 and La_2O_3 . The two rates for evaporating
10 the materials are selectively chosen to provide a dielectric film composition having a predetermined dielectric constant ranging from the dielectric constant of an Al_2O_3 film to the dielectric constant of a La_2O_3 film. In addition to forming a LaAlO_3 gate dielectric for a transistor, memory devices, and information handling devices such as computers include elements having a LaAlO_3 gate electric with a thin equivalent oxide thickness.
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